AMENDMENT TO THE CLAIMS

1. (Currently Amended) A sensor system for computing placement information about a component in an electronic component handling machine, the machine releasably holding the component and adapted to rotate the component, the sensor system comprising:

a sensor;

a plurality of divergent light sources in the sensor disposed to illuminate a sensing field ~~component zone~~ in the sensor;

a detector positioned relative to the light sources so that when the component is at least partially disposed in the sensing field~~component zone~~, the component blocks at least some illumination from at least one of the plurality of divergent light sources to form a shadow of at least a portion of the component on the detector, the detector adapted to provide a plurality of detector outputs while the component rotates;

optics interposed between a sensing field ~~component zone~~ and the plurality of divergent light sources to reduce the divergence of light passing therethrough; and

computing electronics receiving the detector outputs to compute the placement information.

2. (Original) The sensor system of claim 1 wherein the optics is a spherical lens.

3. (Currently Amended) The sensor system of claim 2 wherein the spherical lens has a substantially flat surface disposed proximate the sensing field~~component zone~~.

4. (Original) The sensor system of claim 3 wherein the flat surface provides a seal against contaminants.

5. (Original) The sensor system of claim 1 wherein the optics is a cylindrical lens.

6. (Original) The sensor system of claim 5 wherein the cylindrical lens has a substantially flat rear surface.

7. (Currently Amended) The sensor system of claim 6 wherein the substantially flat rear surface is disposed proximate the sensing field ~~component zone~~ to provide a seal against contaminants.

8. (Original) The sensor system of claim 1, wherein the optics substantially collimates light passing therethrough.

9. (Original) The sensor system of claim 1, and further comprising an ambient light filter disposed proximate the detector to reduce ambient light falling on the detector.

10. (Original) The sensor system of claim 9, wherein the filter is an angular filter.

11. (Original) The sensor system of claim 9, wherein the filter is configured to pass the illumination wavelengths, but attenuate ambient light.

12. (Original) The sensor system of claim 11, wherein the filter is also an angular filter.

AMENDMENT TO THE SPECIFICATION

On page 4, please replace the paragraph beginning on line 2 with the following amended paragraph.

Features of the present invention provide an optical layout that can accommodate the relatively strict enclosure requirements for compact component alignment sensor. Specifically, aspects of the present invention provide a single optical component that reduces the degree of divergence, and preferably substantially collimates light from the plurality of divergent light sources prior to entering the sensing field ~~component zone~~. In this regard, part count is kept low and the physical size of the optical train itself is relatively small.

On page 20, please replace the paragraph beginning on line 14 with the following amended paragraph.

For example, in the example shown in Fig. 7, slight clockwise ~~counter clockwise~~ rotation will bring edge 102 of component 100 into alignment with a ray emanating from source 14. Such alignment will generate a local minimum upon detector portion 24A.

On page 24, please replace the paragraph beginning on line 22 with the following amended paragraph.

Divergent illumination from sources 212, 214 passes through optical element 217 which functions to reduce the degree of divergence of the illumination, and preferably substantially collimate, light passing therethrough. As illustrated, illumination passing through element 217 from source 212 forms a first beam 219 having a reduced divergence, while that from source 214 forms a second beam 221 having a reduced divergence. Preferably, optical element 217 is a lens that can be either spherical or cylindrical. However, a cylindrical lens is preferred. The illumination emerging from element 217 is less divergent, providing a more compact ray

bundle than would otherwise be present, thereby speeding computation of component alignment, since less component rotation is required. Additionally, those skilled in the art will recognize that optical element 217 is disposed backwards from the optically ideal orientation. In this manner, element 217 provides a flat surface proximate the sensing field~~component zone~~ 223. The provision of a flat surface by element 217 proximate the sensing field~~component zone~~ provides a convenient seal in system 210 against contaminants..

On page 31, please replace the paragraph beginning on line 4 with the following amended paragraph.

Features of the present invention provide an optical layout that can accommodate the relatively strict enclosure requirements for compact component alignment sensor. Specifically, aspects of the present invention provide a single optical component that reduces the degree of divergence, and preferably substantially collimates light from the plurality of divergent light sources prior to entering the sensing field~~component zone~~. In this regard, part count is kept low and the physical size of the optical train itself is relatively small.